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(54) CONTAINERS AND CLOSURES THEREFOR

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No. OF CLAIMS 5

CONTAINERS AND CLOSURES THEREFOR

Abstract of the Disclosure

In a container and closure assembly, there is a resilient seal between the two components and the resiliency of the seal determines the normal relative closed positions of the closure and container. When the assembly is included within a stack, there is movement of the closure in the closing direction further to compress the seal. To prevent over-compression of the seal, opposed movement limiting surfaces are provided upon the closure and container, these surfaces being slightly spaced normally, but closing together to take loads directly from closure to container and thus avoid overloading the seal, when the assembly is located in a stack.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A container and closure assembly comprising a closure provided with a container closure portion surrounded by an annular rim portion, the rim portion including a downwardly depending annular flange and the container comprising a sidewall terminating at its upper end in a rim, the closure being closed upon the container rim and the rim and rim portion having mutually engaged locking means retaining the closure upon the rim, the rim and rim portion axially compressing between them a resilient seal, the resiliency of which determines normal relative closed positions of the closure and container, and the closure being movable under downward external pressure from the normal closed position further in the closing direction relative to the container so as to increase axial compression upon the seal, the closure and container mutually comprising an axially facing surface and a surface opposing the axially facing surface, the axially facing surface having a plurality of circumferentially spaced-apart ribs projecting axially therefrom and towards the opposing surface, the ribs being spaced from the opposing surface in the normal closed position of container and closure, movement of the closure in the closing direction causing the ribs and the opposing surface to engage one another to terminate said movement with gaps being formed between the axially facing and opposing surfaces at positions between the ribs into which a prizing tool may be inserted for removal of the closure from the container.

2. An assembly according to claim 1 wherein the container has a radially outward shoulder with an upper

surface and the ribs extend upwardly from the shoulder, movement of the closure in the closing direction causing the ribs to be engaged by the opposing surface which is provided by the closure, the gaps being formed between the shoulder and the closure.

3. An assembly according to claim 1 wherein the container has an annular reinforcement of open-sided box construction extending radially outwards from the sidewall and the ribs extend outwardly from the reinforcement, movement of the closure in the closing direction causing the ribs to be engaged by the opposing surface which is provided by the closure, the gaps being formed between the annular reinforcement and the closure.

4. An assembly according to claim 3 wherein the reinforcement comprises two annular spaced-apart flanges extending radially from the sidewall and a plurality of axially extending walls which join the flanges together and which are spaced-apart circumferentially of the sidewall, and the ribs extend upwardly from the uppermost annular flange.

5. An assembly according to claim 4 wherein each rib is located directly above an axially extending wall.



This invention relates to containers and closures therefor and is concerned particularly with the seating of closures upon container rims and the sealing effect provided between closures and the rims.

5 In closure and container constructions in which effective sealing between the two components is of utmost importance, separate annular seals may be provided, these seals either being detachable from the closure or container or being secured in position by adhesive. To attain a
10 positive seal and positive seat between conventional containers and their closures while preventing movement of the closures upon the containers, it is necessary fully to compress the seals by the closure force between the two components. However, after the full closure force has been
15 applied for a period of time, mechanical hysteresis takes effect and a seal tends to become set in its compressed state thereby reducing the resilient reactive force applied against the container so that the sealing effect is at least partially destroyed. Further, although a seal may be sealing
20 efficiently, it may have set at least partly towards its compressed state in which it is faithfully shaped complementarily to any imperfections against a container or closure seat. In such a case, once the closure has been removed, because it may never be possible for it to be replaced in
25 exactly the same circumferential position upon its container, leakage may take place. Also, when such containers and closures are filled with stored material and are stacked on top of each other, the weight upon the lower containers is such as to increase compression of the seals. In this event,
30 once the weight has been removed from the lower containers,



there is an increased likelihood of leakage around the seals of these containers because any relaxation of pressure of a closure upon its container may not necessarily be accompanied by a relaxation of the seals.

5 It may be thought possible that containers and closures could be designed in such a way that the compressive force applied to seals is reduced thereby reducing the possibility of the seals becoming set once they have been compressed so as to resist any tendency for there to be a
10 leakage path developing around the seals. However, it is difficult to design constructions in which seals are subjected to large degrees of compression without resulting in an assembly in which there is less positive attachment of closures to containers and resultant sloppiness of fit
15 which is not a desirable characteristic of containers, especially those of large capacity.

 A container and closure assembly, according to the invention, comprising a closure provided with a container closure portion surrounded by an annular rim portion, including a downwardly depending annular flange. The container
20 has a sidewall terminating at its upper end in a rim. The closure is closed upon the container rim and the rim and rim portion have mutually engaged locking means retaining the closure upon the rim. The rim and rim portion axially
25 compress, between them, a resilient seal. The resiliency of the seal determines the normal relative closed positions of the closure and container. The closure is movable under downward external pressure from the normal closed position further in the closing direction relative to the container,
30 so as to increase axial compression upon the seal. The closure and container mutually comprising an axially facing surface and a surface opposing the axially facing surface.

The axially facing surface has a plurality of circumferentially spaced-apart ribs projecting axially therefrom and towards the opposing surface. The ribs are spaced from the opposing surface in the normal closed position of the container and closure. Movement of the closure in the closing direction causes the ribs and the opposing surface to engage one another to terminate the movement, with gaps being formed between the axially facing and opposing surfaces at positions between the ribs into which a prizing tool may be inserted for removing the closure from the container.

The invention contemplates a preferred structure in which the container has an outwardly radial shoulder with an upper surface and the ribs extend upwardly from the shoulder. Movement of the closure in the closing direction causes the ribs to be engaged by the opposing surface provided by the closure. The gaps are formed between the shoulder and the closure. In another preferred aspect, the container has an annular reinforcement of open-sided box construction, extending radially outwards from the sidewall and the ribs extend upwardly from the reinforcement. Movement of the closure, in the closing direction, causes the ribs to be engaged by the opposing surface provided by the closure. The gaps are formed between the annular reinforcement and the closure.

In another preferred aspect, the reinforcement comprises two annular spaced-apart flanges extending radially from the sidewall and a plurality of axially extending walls which join the flanges together and which are spaced apart circumferentially of the sidewall. The ribs extend upwardly from the uppermost annular flange. Each rib may be located directly above an axially extending wall.

10 It is envisaged that the distance between the rib
and the other surface may be possibly up to .020 inches but
it is preferred that the distance should be no greater than
.010 inches.

15 Embodiments of the invention will now be described
by way of example with reference to the accompanying drawings
in which:-

FIGURE 1 is a side elevational view of a container
and closure assembly according to a first
embodiment;

20 FIGURE 2 is a cross-sectional view along the axis
of the assembly showing part of the
assembly on a larger scale than that shown
in Figure 1;

FIGURE 3 is an isometric view of part of the
container shown in Figure 2;

25 FIGURE 4 is a side elevational view of a container
and closure assembly according to a
second embodiment;

30 FIGURE 5 is an isometric view of part of the con-
tainer of Figure 4 but on a larger scale;
and

FIGURE 6 is a cross-sectional view along the axis of the assembly and showing part of the assembly.

As shown in Figure 1, in a first embodiment a
5 2-gallon container and closure assembly generally shown by numeral 1 includes a container 2 and closure 3 both moulded from high density polyethylene although other suitable mouldable plastics materials, e.g. polypropylene, may be used. The closure 3 comprises a container cover portion 4
10 which is surrounded by an annular rim portion 5. The rim portion 5 is of inverted U-shape having an annular inner wall 6 spaced around which is an outer annular wall 7, the two walls being joined together at their base 8. Lying within the U-shaped rim at the base is a resilient O-ring
15 seal 9 made of elastomeric material. The outer wall 7 extends downwardly and part way down its length is provided with a locking means in the form of a radially inwards projection 10. Below the projection 10, the outer wall 7 is splayed outwards slightly at 11 and terminates in a planar
20 annular foot or flange 12. The flange 12 has a lower planar axially facing surface 13.

The container 2 has a side wall 14 which is of frusto-conical form and having at its wider upper end a rim
15 which is approximately 9 inches in diameter and has a locking means in the form of a downwardly depending shoulder
25 16 which is engaged by the projection 10 to hold the container and closure assembled together. The seal 9 is trapped between the rim 15 of the container and the base 8 of the U-shaped rim portion of the closure and the resilient
30 nature of the seal normally holds the container and closure

together with the shoulder 16 engaged by the projection 10
as shown in Figure 2. There is, therefore, no means provided
for positive engagement of the closure and container together
in their closing direction upon assembly so that if a loaded
5 container of similar construction is placed on top of the
assembly in stacking relationship during storage, this
immediately means that the seal 9 will be compressed further
as the closure is moved downwards onto the container so as
to disengage the projection from the shoulder 16. To prevent
10 the over-engagement of closure and container going beyond
specified and desirable limits such that undue distortion of
the seal 9 would take place, a means is provided for prevent-
ing over-engagement of the closure and container. This
means which comprises the lower surface 13 of the flange 12
15 also includes a plurality of radially extending circum-
ferentially spaced-apart ribs 17 which extend outwards from
and are spaced from the side wall of the container. The
ribs which are spaced about 2 inches apart also extend up-
wardly from an upwardly axially facing surface of an annular
20 shoulder 18 which projects outwardly from the side wall.
Each rib is of rectangular cross-section and tapers upwardly
to a horizontal surface 19 which is about 1/2" wide and
opposes the surface 13 of the flange 12 while being spaced
slightly below it in the normal position of the closure and
25 container, i.e. when the shoulder 16 is engaged by the pro-
jection 10. In this condition of the parts of the assembly,
the distance between the surfaces 13 and 19 is preferably of
the order of between .008 and .010 inches.

In use of the above construction, when the con-
30 tainer is filled with a product and the closure is placed on

top, the resilient seal 9 effectively seals between the parts while holding the projection 10 in engagement with the shoulder 16. Should the container be placed in a stack of stored containers with a container or containers located on top of the closure 3, then a force is applied to the closure which has the effect of resiliently loading the seal 9 so as to force the closure further downwards onto the container, i.e. in the closing direction. Clearly, such force would have the effect of compressing the seal 9 possibly to its limits without the use of the annular flange 12 and the ribs 17. However, after the closure has moved by up to 0.10 inches in the example, the surface 13 engages the surfaces 19 of the ribs so as to prevent any further downward movement of the closure and the weight of the stack of containers above the assembly is carried through the closure and down the container side wall.

It is clear, therefore, from the above that the seal 9 even under loaded conditions is not distorted to any substantial extent beyond its normal closed position as shown in Figure 2. This means that should the assembly be removed from the stack, then the seal should not have set unduly in position and will still seal effectively between the container rim and the base of the U-shaped rim portion of the closure.

In contrast to this, in a situation in which no opposing movement limiting surfaces are provided, i.e. a construction not coming within the scope of the invention, it could be found that the seal 9 would be compressed to such an extent that after a period of time in loading condition the elastomeric material had become set so that when

the closure and container return to their relative normal position, a gap or gaps would develop around the seal thus allowing for contamination or leakage of the contained product.

5 Apart from the fact that the above described construction allows for a sealing action to take place which is permanent even after the assembly has been removed from a loaded stack of containers, the assembly is also constructed so as to enable the closure to be removed from
10 the container fairly simply. While minimum gap requirements are provided between the surfaces 13 and 19, the use of the shoulder 18 spaced from the surface 13 provides a gap between spaced-apart ribs into which a prising tool such as a screwdriver or opening bar may be inserted.

15 In a second embodiment having all the advantages discussed above for the first embodiment, a 5-gallon container and closure assembly as shown in Figure 4 comprises a container 20 and closure 21.

 As is shown by Figures 5 and 6, the container 20
20 has ribs 17 which serve to prevent the closure from moving downwardly beyond a limit determined by the engagement of an axially facing undersurface 22 of the closure with the ribs when similar and filled containers are in a stacked condition. As described for the first embodiment, therefore, this pre-
25 vents undue compression of a compressible O-ring seal 23 which lies between the base of a U-shaped rim 24 of the closure and a rim 25 of the container.

 For the purpose of preventing undue distortion of the side wall 26 of the container under the load imposed
30 upon it by stacked containers above it, a side wall reinforce-

ment 27 carries the ribs 17. This reinforcement also ensures the loads upon the container are dissipated into the side wall without the build-up of any undue stress conditions which could lead to splitting of the plastic material forming the side wall. The reinforcement comprises two annular planar flanges 28 and 29 which extend radially outwards from the side wall 26 in slightly spaced apart relationship and these two flanges are integrally joined together, not only by the side wall itself, but also by a plurality of circumferentially spaced, radially and axially extending walls 30 which make the reinforcement into a box construction which is open-sided, i.e. is open in the radial direction. The upper flange 28 is integrally formed with the upstanding ribs 17 extending from an axially facing upper surface of the flange. The ribs are preferably positioned directly above the walls 30 as shown in Figure 5. The relative dimensions and relative positioning of the walls 30 and flanges 28 and 29 are subject to design considerations and are not considered to be limitations necessary to the box section reinforcement. In the 5-gallon container being described the walls 30 lie about 1" apart around the container and the flanges 28 and 29 are approximately 1/2 inch apart with the thickness of walls and flanges being about .090 inches.

In use of the 5-gallon container and closure assembly when it is stacked in filled condition with other containers above it, the seal 23 is compressed until the closure undersurface engages the ribs 17. Thereafter, substantially no further compression of the seal 23 takes place and the stacking load is taken through the ribs 17 and into

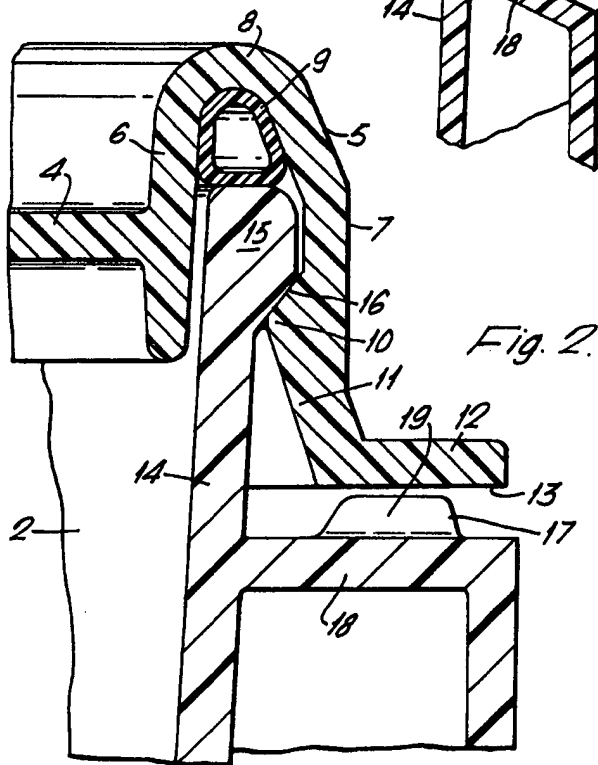
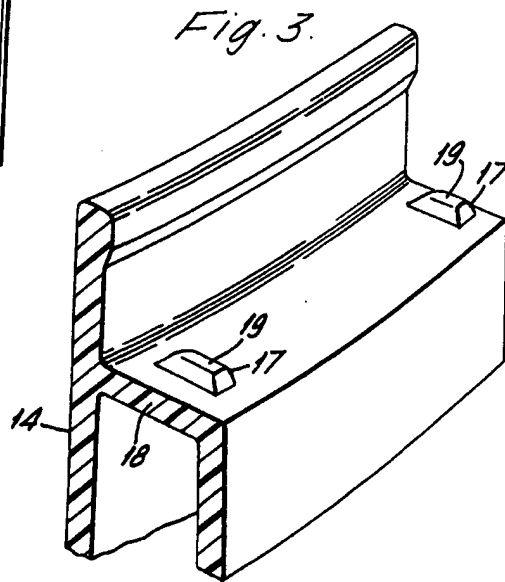
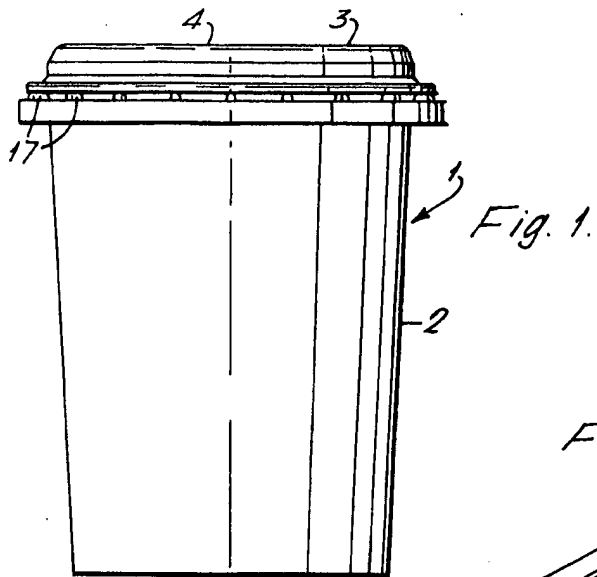
the side wall 26 through the reinforcement 27. If the stacking load is particularly excessive, the reinforcement 27, because of its box construction, resists any tendency to twist upon the side wall so that virtually no distortion of the side wall takes place and side wall splitting or cracking is avoided.

It will, of course, be realized that ribs may be provided upon the closure instead of upon the container. In a practical construction, i.e. a modification of the second embodiment (not shown), ribs 17 would be omitted from the flange 28 and ribs would extend downwardly from the undersurface 22 of the closure with which they would be integral. In the modification, the closure ribs would normally be spaced from the flange 28 but would engage the flange during downward movement of the closure so as to prevent overengagement of container and closure.

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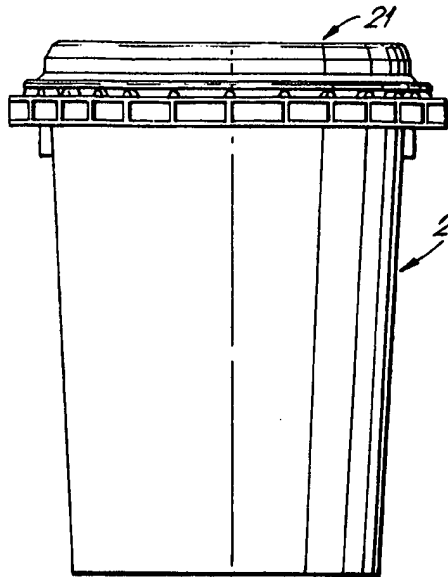
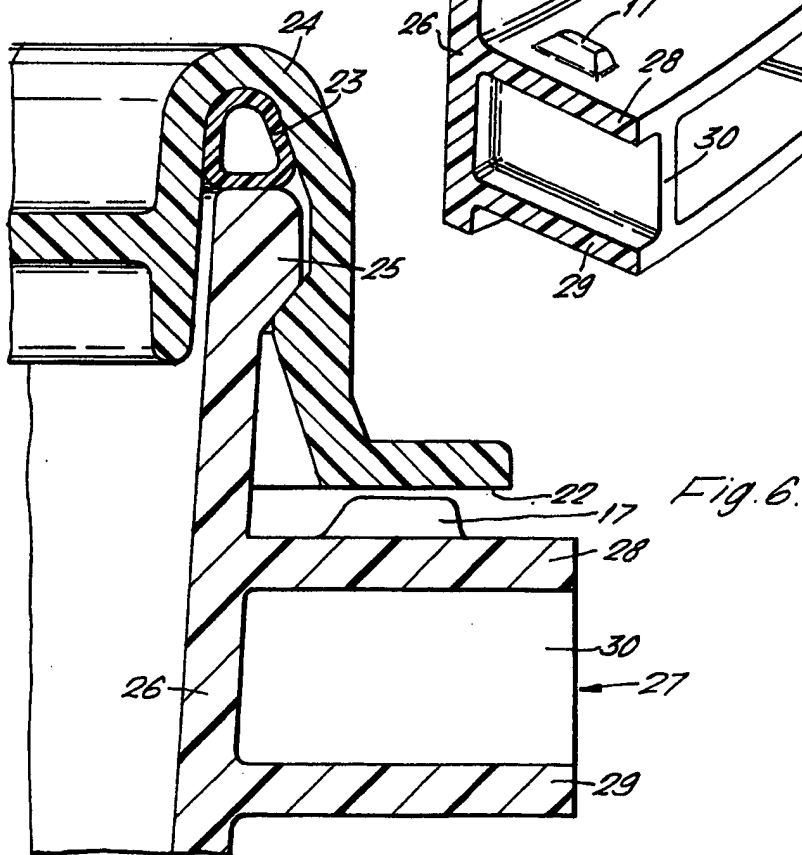
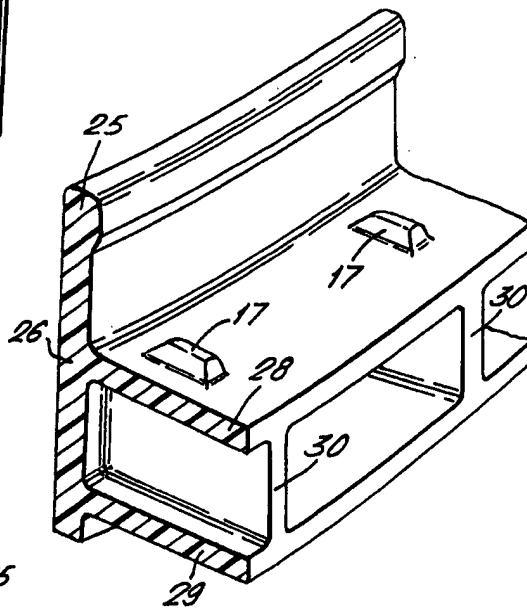


Fig. 5.



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(19) (CA) **CANADIAN PATENT** (12)

(54) TRAY CONSTRUCTION

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(73) Granted to Mayled/Intini Design
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No. OF CLAIMS 12

ABSTRACT OF THE DISCLOSURE

An improved tray construction comprising a tray portion, the tray portion having a bottom wall, a first pair of opposed spaced-apart rigid walls extending away from the bottom wall, and a second pair of spaced-apart walls. At least one of the second pair of spaced-apart walls has inwardly directed projecting means situated thereon. Adjacent ends of the first pair of rigid walls and an adjacent side of the bottom wall are interconnected by a continuous outer side surface. The first and second pair of walls and the bottom wall define a product receiving compartment means. A lower surface of the projecting means is adapted to retain at least one solid product contained in the product receiving compartment means of the tray; and at least one of the second pair of spaced-apart walls are pivotally secured to the container. The at least one pivotally secured wall is adapted to be pivoted between an open position for receiving at least one solid product in the product receiving compartment means of the tray and a closed position in which the at least one projecting means retains the at least one solid product within the receiving compartment means of the tray.